

# UK Patent Application

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(54) Plant growth stimulator

(57) Acetaminophen and/or anthranilic acid and its salts is/are used to potentiate plant-growth stimulation by ammonium thiosulphate. Aqueous solutions of the mixed materials are sprayed onto plants.

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PLANT GROWTH STIMULATOR

It is known that ammonium thiosulphate can be used to stimulate plant growth. The present invention is based on the discovery that 5 acetaminophen (N-acetyl-p-hydroxy aminophenol) and/or anthranilic acid (2-aminobenzoic acid) in combination with ammonium thiosulphate gives an unexpected synergistic effect, the greatest synergistic response being obtained by the use of a mixture of all three materials.

In accordance with the present invention there is provided a 10 mixture of ammonium thiosulphate with one or both of acetaminophen and anthranilic acid or anthranilic acid salts. Also in accordance with the invention, such mixtures are put in aqueous solution suitable for spraying onto plants. The use of such spray mixtures in the treatment of plants to stimulate root, shoot and seed production in crop plants 15 is another aspect of the present invention. Use of these materials in accordance with the invention stimulates plant growth and yield of product.

The amount of ammonium thiosulphate in a concentrate to be sold for dilution is preferably 60 to 650 grams per litre, and the solution 20 is applied in quantities such that the amount of ammonium thiosulphate applied per hectare is upwards of 60 g, preferably 100 g to 10 Kg, particularly 250 g to 3 Kg. Above 10 Kg/ha is uneconomic, below 60 g/ha it is difficult to obtain worthwhile results.

The rates per hectare of acetaminophen and anthranilic acid (or 25 its salts) which may be usefully applied are from about 0.1 gram (100 milligrams) to about 500 grams of each per hectare, whether used singly or in combination. The maximum for anthranilic acid is preferably 300 g/hectare.

These materials may be applied in from 5 to 1500 litres of water 30 per hectare and may conveniently be applied in admixture with herbicides, fungicides, insecticides or plant growth regulators.

The rates per hectare are the critical quantities and the concentration of the solution is adjusted to give suitable rates of spraying. Normally 300 to 400 litres of solution would be sprayed per 35 hectare, and 1 litre of the concentrate for dilution to this amount could contain as little as 0.05 g/l acetaminophen and 0.017 g/l of anthranilic acid.

A surfactant material such as nonyl phenyl ethylene oxide condensate or other agricultural wetting agent may be used in combination with the mixtures.

The following is an Example of a suitable concentrate for use in  
5 accordance with the invention:

EXAMPLE

	<u>gram/litre</u>
	Ammonium thiosulphate
10	600
	Acetaminophen
	0.75
	Anthranilic acid
	0.25
	Surfactant/wetting agent
	5

This material may be applied at about 1 - 10 litres per hectare,  
15 after suitable dilution into 5 to 1500, preferably 200 to 400, litres  
of water.

In order to demonstrate the effect of the compositions of the invention, mercia wheat was grown in sand culture using a full nutritional solution containing fully adequate levels of nitrogen,  
20 potassium, phosphorus, sulphur and trace elements. Under these conditions, treatment with ammonium thiosulphate alone produced no significant effect on growth.

The quantities of materials used in 1 litre of concentrate are those set out in the Example, and 5 litres of concentrate, diluted in  
25 200 litres of water, is applied per hectare.

Solutions Used (all aqueous solutions)

- A Water only
- 1. Ammonium thiosulphate
- 30 2. Ammonium thiosulphate + acetaminophen
- 3. Ammonium thiosulphate + anthranilic acid
- 4. Ammonium thiosulphate + anthranilic acid
- 5. Acetaminophen
- 6. Anthranilic acid
- 35 7. Acetaminophen + anthranilic acid

Method

Plants of mercia wheat growing in sand culture with full nutrition were sprayed at the three-leaf stage. Total roots and shoots were harvested after 15 days and the fresh weights measured.

5

## % increase in fresh weight over spraying with water only (A)

	1	2	3	4	5	6	7
10	NIL	5.2	3.8	13.7	2.0	1.6	4.4

In oilseed rape (var capricorn) at the 'green bud turning yellow' stage, sprays Nos 1, 4 and 7 were compared with respect to the pods per plant reaching maturity. The percentage increases over 1 (ammonium thiosulphate only) were:

		Solution 4	Solution 7
20	Percentage increase in pod numbers over solution 1	9.4	5.8

CLAIMS

1. A mixture of ammonium thiosulphate with acetaminophen.
- 5 2. A mixture of ammonium thiosulphate with anthranilic acid or a salt thereof.
3. A mixture of ammonium thiosulphate, acetaminophen and anthranilic acid or the salts thereof.
- 10 4. A mixture as claimed in Claim 2 or 3 in which the salt of anthranilic acid is its sodium, potassium or ammonium salt.
- 15 5. An aqueous solution of a mixture as claimed in any one of Claims 1 to 4.
6. The use of a mixture as claimed in Claim 5 to treat crop plants to stimulate root, shoot and seed production by spraying the mixture onto the crop.
- 20 7. The use of a mixture as claimed in Claim 5 to stimulate plant growth and product yield by spraying the mixture onto the plant.
- 25 8. A use as claimed in Claim 6 or 7 in which the amount of ammonium thiosulphate applied is 250 g/ha to 3 Kg/ha, the amount of acetaminophen is from 0.1 to 500 g/ha, and the amount of anthranilic acid or its salt is from 0.1 to 300 g/ha.
- 30 9. A composition as claimed in Claim 5 substantially as described in the Example.
10. The use of anthranilic acid or a salt thereof and/or of acetaminophen to potentiate the antifungal action of ammonium thiosulphate.

5.  
Patents Act 1977

Examiner's report to the Comptroller under  
Section 17 (The Search Report)

Application number

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Relevant Technical fields

(i) UK CI (Edition K ) C1B (BAB)

(ii) Int CI (Edition 5 ) A01N

Search Examiner

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Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE - CAS ONLINE

Date of Search

16.11.92

Documents considered relevant following a search in respect of claims 1-10

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

Category	Identity of document and relevant passages	Relevant to claim(s)

### Categories of documents

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